

# Training Manual for USDA Standards for Grading Slaughter Animals



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by Fred L. Williams, Jr. (1991)

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[Beef Quality & Yield Grading](#)

[Feeder Cattle Grades](#)

[Beef Yield Grades](#)

[Slaughter Lamb Grading](#)

[Slaughter Hog Grading](#)

[Slaughter Goat Grading](#)

[Animal Science Terms](#)

# GUIDELINES FOR SEGREGATING SLAUGHTER COWS ACCORDING TO TISSUE LEAN PERCENT

## 1) Introduction

The official grades for mature slaughter cattle and for beef carcasses in maturity groups C, D, and E, and promulgated in the Official United States Standards for Grades of Slaughter Cattle and Beef Carcasses do not reflect the current marketing of this beef. To address this issue the U.S. Department of Agriculture (USDA) supported research at the University of Georgia and Colorado State University to provide data for updating these standards. These guidelines apply to slaughter steers, heifers, and cows in C, D, and E maturity as described in the official standards. Steers, heifers, cows, and bulls in A or B maturity are not affected by this “guideline” and will continue to be evaluated only under the official standards.

## 2) Background

Existing official grade standards do not reflect current trade practices for the cow beef sector of the beef industry. Consequently, packers who process cows almost never use the beef carcass grades. The official nomenclature is used extensively to describe slaughter cows but have no relation to the cow's ultimate use. The quality grades Commercial, Utility, Cutter and Canner do not relate to the industry's primary product, boneless manufacturing beef. Moreover, yield grades are never used because they predict a cutability endpoint—yield of boneless, closely trimmed steak and roast cuts—which is inappropriate for describing cows whose value is determined by yield of boneless lean beef.

USDA cooperated with, and partially funded, research at Colorado State University and the University of Georgia to develop a scientific database, which was used to develop these guidelines for mature cows and their carcasses. The research included cows with a wide range of body type, weight, finish, and muscling. From this research an equation using fat thickness, weight, and muscle score was shown to be highly accurate in predicting total tissue lean percent ( $R^2 > .79$ ). Therefore, it was concluded that an equation based on practical and easy to obtain predictors can be used to accurately predict tissue lean percent (TLP) endpoints for both live cows and carcasses. TLP indicates the actual lean content of the untrimmed boneless soft tissue product (mostly lean and fat) from the carcass. This is the endpoint most closely associated with the industry's current value determining practices. By predicting TLP, producers and packers can evaluate cows and sort them based on TLP yield of 90's (at least 90% TLP), 85's (85-89.9% TLP), 80's (80-84.9% TLP), 75's (75-79.9% TLP) or 70's (74.9% or less TLP). Use of this system should result in more uniform pricing and market reporting in the slaughter cow and cow carcass trade.

In recent years, some cull cows have been placed in feedlots for a brief period of concentrate feeding before slaughter. Cows fed concentrates produce; (1) Heavier carcasses with higher levels of marbling, (2) white fat, rather than the yellow fat which is characteristic of forage-fed cows, (3) brighter lean color, and (4) improved palatability characteristics. The higher quality of programs by packers who

routinely slaughter fed cows. Such programs frequently are referred to as “white-cow” programs because the distinguishing characteristic of the carcasses and cuts from fed cows is their white external fat covering.

Quality grades for slaughter cows and cow carcasses have only limited application in today’s beef industry. Few if any cow processors choose to grade cow carcasses, and it is doubtful that they will do so in the future. Nevertheless, a grading system that would effectively identify differences in the quality of loin and rib cuts from cow carcasses could facilitate marketing of some cow middle meat programs and would satisfy the need to improve the uniformity and usefulness of market information for live cows and cow beef. Consequently, these guidelines provide for grades for high quality cows. The quality grades are similar to the current U.S. Commercial grade. Cows with a Moderate degree of marbling in C or D maturity can be identified as Premium or Premium White (Premium White meeting the qualifications of Premium, plus, having white color fat).

### 3) Procedures

These guidelines for grades of slaughter cows and their carcasses consist of 5 categories and are based on the percent of tissue lean (TLP) from the total soft tissue generated from each carcass. The categories are 90’s (90% TLP or greater), 85’s (85-89.9% TLP), 80’s (80-84.9%), 75’s (75-79.9%) 70’s (less than 74.9%). The factors used to determine the classification of live slaughter cows are adjusted live preliminary yield grade<sup>1</sup> (LAPYG), live weight (LW) and a 9 point muscle score (MS) (1=thin-, 5=average and 9=thick+). Determination of the TLP for carcasses uses carcass adjusted preliminary yield grade (CAPYG), muscle score (MS) and hot carcass weight (HCW)

The regression equation developed to determine the percent tissue lean in live slaughter cows is:

Lean Tissue %=  $113.4 - 8.9(\text{live adjusted preliminary yield grade}) - .008(\text{live weight}) + .33(\text{live muscle score})$ .

The regression equation developed to determine the percent tissue lean in cow carcasses:

Lean Tissue %=  $112.0 - 7.6(\text{carcass adjusted preliminary yield grade}) - .015(\text{HCW}) + .065(\text{carcass muscle score})$ .

The different coefficients between the live and carcass equations are a result of the variability in the ranges for adjusted preliminary yield grade, weight and muscle score between live animals and their carcasses.

#### i) Short Cut Method

Determination of tissue lean (TLP) in a market situation warrants the use of a short cut method so individuals may correctly classify live animals and carcasses in a timely manner. Below

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<sup>1</sup> Technical explanations can be found in the United States Standards for Grades of Slaughter Cattle and United States Standards for Grades of Beef Carcasses, January 31, 1997. The standards can also be reviewed on the Internet at [www.ams.usda.gov/standards/stanls.htm](http://www.ams.usda.gov/standards/stanls.htm)

is a description of the short cut method for determining TLP in live slaughter cows and cow carcasses.

Determining ALPYG and converting to PTLP and adjusting for variation in live weight and muscle score derives TLP.

Step 1: Determine the relationship between Live Adjusted Preliminary tissue lean percent (PTLP). Absolute 0 fat cover =90% PTLP. Preliminary tissue lean percentage decreases 1.0% for every .1 increase in adjusted preliminary yield grade.

#### **PRELIMINARY PERCENT LEAN**

Fat(in.)	%Lean
AB 0	90
0	88
.1	86
.2	83
.3	81
.4	78

Fat (in.)	%Lean
.5	76
.6	73
.7	71
.8	68
.9	66
1.0	63

Step 2: The PTLP must be adjusted for variations in live weight. Using a base live weight of 1100 lb., the preliminary tissue lean is adjusted .8% for every 100-lb. deviation from the base. The PTLP is increased .8%, each 100 lb. live weight above the base of 1100 pounds. The PTLP is decreased .8% for each 100 lb. Below 1100 lb.

## WEIGHT ADJUSTMENT

Weight	Adj.
1500	-3.2
1400	-2.4
1300	-1.6
1200	-.08
1100	0.0
1000	+.8
900	+1.6
800	+2.4
700	+3.2
600	+4.0

1100# = no adjustment

Each 100# over 1100# = subtract .8%

Each 100# under 1100# = + .8%

Step 3: The PTLP must now be adjusted for variations in muscling. The base live muscle score is 3 (thin +). Each muscle score affects PTLP 3%. Muscle scores 1-3 are thin with 1 being the thinnest, 4-6 are average, and 7-9 are thick muscled with 9 being the thickest. Muscling scores above the base (thicker muscling improves tissue lean) increases the PTLP .3% for each muscling score above the base. Muscling scores below the base (thinner muscling decrease tissue lean) reduces the PTLP .3% for each muscling score below the base.

## MUSCLE ADJUSTMENT

Muscle Score		Adj.
Thin-	1	-.66
Thin	2	-.33
Thin +	3	0.0
Average -	4	+.33
Average	5	+.66
Average +	6	+.99
Thick -	7	+1.32
Thick	8	+1.65
Thick +	9	+1.98

3= No adjustment

Each numerical score less than 3= - .3%

Each numerical score more than 3= + .3%

ii) Examples



85-90% Lean

Fat (IN) = 0  
Preliminary % Lean = 88  
Weight ADJ= 900 lbs. = +1.6  
Muscle Score = Thin = -.33  
Final % Lean = 89



80-85% Lean

Fat (IN) = .2  
Preliminary % Lean = 83  
Weight ADJ= 1100 lbs. = 0  
Muscle Score = Ave- = +.33  
Final % Lean = 83



75-80% Lean

Fat (IN) = .3

Preliminary % Lean = 81

Weight ADJ= 1300 lbs. = -1.6

Muscle Score = Ave- = +.33

Final % Lean = 79.73



70-75% Lean

Fat (IN) = .7

Preliminary % Lean = 71

Weight ADJ= 1100 lbs. = 0

Muscle Score = Ave- = +.33

Final % Lean = 71.33

#### 4. Cow carcasses

TLP is derived by determining the relationship between CPYG, converting to PTLP and adjusting for variations in carcass weight and muscle score.

Step 1: Determine the relationship between Preliminary adjusted carcass yield grade and preliminary tissue lean percent (PTLP) Absolute 0 fat cover =CAPYG 1.8 = 90.0% PTLP and decreases .8% for every .1 increase in CPYG.

Step 2: The PTLP must be adjusted for variations in hot carcass weight. The base hot carcass weight is 600 lb. Adjust the PTLP 2.0% for each 100 lb. deviation from the base. Add 2.0% for each 100 lb. Below 600 lb. carcass weight and subtract 2.0% for each 100 lb. Over the 600 lb. Carcass weight.

Step 3: Adjust the PTLP for variations in muscle score. The base muscle score is 4 (average -). The PTLP adjusted .1% for every muscle score deviation from the base. Muscle score 1-3 are thin with 1 representing the thinnest, 4-6 are average in thickness, and 7-9 are thick with 9 being the thickest. Add the adjustment for muscle scores above the base (thicker muscling improves tissue lean), Subtract the adjustment for muscle scores below the base (thinner muscling decreases tissue lean).

The current yield grade standards were designed for fed steers and heifers. When a 0.0 fat measurement is obtained at the 12<sup>th</sup> rib, it is common for very thin area of fat to be present in the flank, sirloin, tail head region, etc. The adjusted preliminary yield grade on these “measured” 0.0 fat is commonly 2.0. However, it is common for some cull cows to have absolutely no fat covering at any location. These cows warrant a 1.8 preliminary yield grade unlike most fed steers and heifers with a measured 0.0 fat at the 12<sup>th</sup> rib.

In order for these guidelines to be utilized to their fullest, a quality grade is made available in addition to the aforementioned TLP grades. Cows in C and D maturity with Moderate or higher marbling can be graded Premium. Some fed cows may develop a white fat, which may command a higher market value. Using a color scale of 1=white, 2=Creamy white, 3=Slightly Yellow, 4=Yellow, 5=Light Yellow-Orange, cows or their carcasses with 1 or 2 fat color score, that also meet the Premium requirements, may be designated Premium White. This determination is directly evaluated in carcasses. However, slaughter cows on known feed, time on feed, reputation, etc. can be designated as Premium White.

All slaughter cows and their carcasses with a APYG of less than 2.0 will be designated as a 90% PTLP, regardless of its muscle score, or live or carcass weight.